

FCC Test Report

Report No.: AGC08293200902FE05

FCC ID : 2AUAU-A4

APPLICATION PURPOSE: Original Equipment

PRODUCT DESIGNATION: A4

BRAND NAME : N/A

MODEL NAME : See Page 5

APPLICANT: Amovision Technology Co., Ltd

DATE OF ISSUE : Sep. 30, 2020

STANDARD(S)

TEST PROCEDURE(S)

: FCC Part 15.247

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes	
V1.0	1	Sep. 30, 2020	Valid	Initial Release	

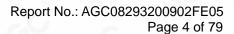
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1. VERIFICATION OF CONFORMITY

Amovision Technology Co., Ltd
2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China
Amovision Technology Co., Ltd
2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China
Amovision Technology Co., Ltd
2/F, Building C, Xinghezhong Shenlan Innovation Incubator, #63 Huan Guan South Road, Long Hua District, Shenzhen City, China
A4
N/A
A4
A1, A1 1080P, A1K, A1S, A1P, A2, A3S, A3K, A3 1080P, A3M, A3P, A3 Pro, A4 Pro, A4 Plus, A4M, A4K, A4S, A5, A5 Pro, A6, A6 Pro, A7, A7 Pro, A8, A9, A10, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C10-TZ, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, HMD2, HMD4, HMB1, ZM-A3, ZM-WFA3, ZM-WFA3K, ZM-WFA3S, CT-AYBWC, HMD3
All the same except for the model name.
Sep. 14, 2020 to Sep. 29, 2020
No any deviation from the test method
Normal
Pass
AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Prepared By

John Zeng
(Project Engineer)

Max Zhang
(Reviewer)

Approved By

Forrest Lei
(Authorized Officer)

Sep. 29, 2020

Sep. 29, 2020

Sep. 30, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "A4". It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency 2.412 GHz~2.462GHz					
Output Power(Average)	IEEE 802.11b:15.68dBm; IEEE 802.11g:14.95dBm; IEEE 802.11n(20): 12.65dBm				
Output Power(PK)	IEEE 802.11b:18.46dBm; IEEE 802.11g:21.91dBm; IEEE 802.11n(20): 20.55dBm				
Modulation DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM					
Number of channels 11					
Hardware Version	1.0				
Software Version	V1.0				
Antenna Designation Integral antenna(Comply with requirements of the FCC part 15.20					
Antenna Gain	2dBi				
Power Supply DC 3.7V by battery					

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	10	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
2400~2483.5MHZ	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11.

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2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	Modulation R	R NBPSC	NCBPS		NDBPS		Data rate(Mbps) 800nsGl	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	<u>1</u>	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation Number of spatial streams	
NSS		
R	Code rate	
NBPSC	Number of coded bits per single carrie	
NCBPS	Number of coded bits per symbol	
NDBPS	Number of data bits per symbol	
GI	Guard interval	

2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID**: 2AUAU-A4 filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

KDB 558074 D01 15.247 Meas Guidance v05: Guidance for compliance measurements on Digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

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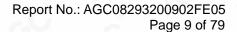
2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.8. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX

Note:

Transmit by 802.11b with Date rate (1/2/5.5/11)

Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)

Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)

Transmit by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)

Note:

- 1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
- 2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
- 3. The test software is the SecureCRTPortable which can set the EUT into the individual test modes.
- 4. For battery operated equipment, the equipment tests are performed using a new battery.

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5. SYSTEM TEST CONFIGURATION 5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	ent Model No. ID or Spe		Remark
1	A4	A4	2AUAU-A4	EUT
2	Adapter	HW-050200U2W		AE
3	USB Cable		0.8m unshield	AE
4	Control Box		USB_TTL	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

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6. TEST FACILITY

Test Site Attestation of Global Compliance (Shenzhen) Co., Ltd				
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community,			
Location	Fuhai Street, Bao'an District, Shenzhen, Guangdong, China			
Designation Number CN1259				
FCC Test Firm Registration Number	975832			
A2LA Cert. No.	5054.02			
Description Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2				

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	10096	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03, 2020	Jul. 02, 2021

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
Power sensor	Aglient	U2021XA	MY54110007	Sep. 10, 2020	Sep. 09, 2021
2.4GHz Fliter	Micro-tronics	087	N/A	Feb. 26, 2020	Feb. 25, 2021
Attenuator	Weinachel Corp	58-30-33	N/A	Sep. 09, 2019	Sep. 08, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	00034609	May. 17, 2019	May. 16, 2021
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020

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ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 20, 2019	Sep. 19, 2021
Took ooftware	Tanasand	JS32-RE	NI/A	NI/A	NI/A
Test software	Tonscend	(Ver.2.5)	N/A	N/A	N/A

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7. OUTPUT POWER

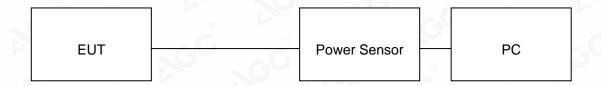
7.1. MEASUREMENT PROCEDURE

For average power test:

- 1. Connect EUT RF output port to power sensor through an RF attenuator.
- 2. Connect the power sensor to the PC.
- 3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 4. Record the maximum power from the software.

Note: The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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7.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	OUTPUT POWER
TEST MODE	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	12.05	14.89	30	Pass
2.437	13.78	16.53	30	Pass
2.462	15.68	18.46	30	Pass

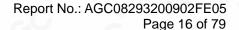
TEST ITEM	OUTPUT POWER		10	< GC
TEST MODE	802.11g with data rate 6	8	@	

Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	11.10	18.88	30	Pass
2.437	12.07	19.98	30	Pass
2.462	14.95	21.91	30	Pass

TEST ITEM	OUTPUT POWER			10
TEST MODE	802.11n 20 with data rate 6.5	c ₁ C	0	00

	Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
8	2.412	9.80	16.77	30	Pass
	2.437	11.64	18.54	30	Pass
	2.462	12.65	20.55	30	Pass

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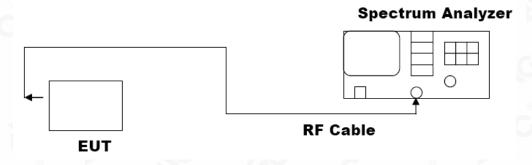
8. 6 DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW ≫ × RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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8.3. LIMITS AND MEASUREMENT RESULTS

TEST ITEM	6DB BANDWIDTH	-6	@	
TEST MODE	802.11b with data rate 11		CO	~ .C

LIMITS AND MEASUREMENT RESULT					
Applicable Limite	Applicable Limits				
Applicable Limits	Test Data	a (MHz)	Criteria		
	Low Channel	9.061	PASS		
>500KHZ	Middle Channel	9.066	PASS		
	High Channel	9.090	PASS		

TEST ITEM	6DB BANDWIDTH	0		
TEST MODE	802.11g with data rate 54		<i>c.</i> C	0

LIMITS AND MEASUREMENT RESULT				
A P I I . I ! ! .	Applicable Limits			
Applicable Limits	Test Data (MHz)		Criteria	
	Low Channel	16.45	PASS	
>500KHZ	Middle Channel	16.45	PASS	
	High Channel	16.47	PASS	

TEST ITEM	6DB BANDWIDTH	NO	- GC
TEST MODE	802.11n 20 with data rate 65		

LIMITS AND MEASUREMENT RESULT				
Annliaghla Limita	Applicable Limits			
Applicable Limits	Test Data (MHz)		Criteria	
	Low Channel	17.62	PASS	
>500KHZ	Middle Channel	17.68	PASS	
	High Channel	17.71	PASS	

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802.11b TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



802.11g TEST RESULTTEST PLOT OF BANDWIDTH FOR LOW CHANNEL



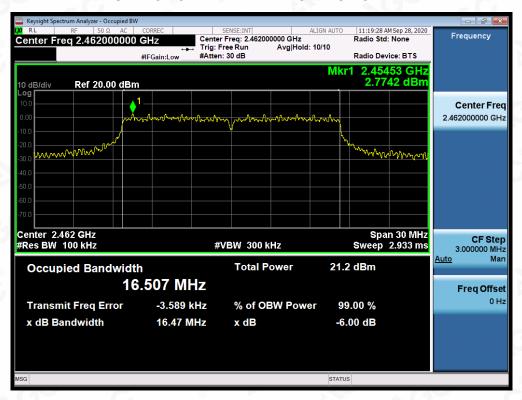
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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802.11n (20) TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



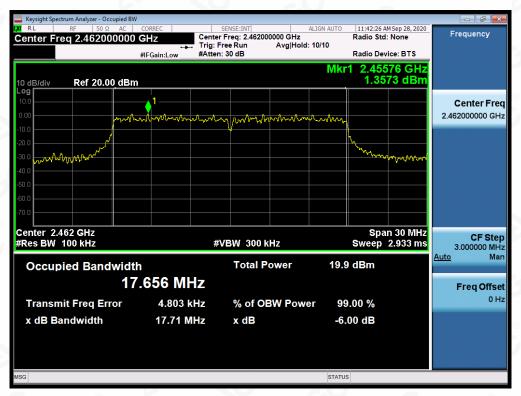
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

9.3. MEASUREMENT EQUIPMENT USEDJN

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

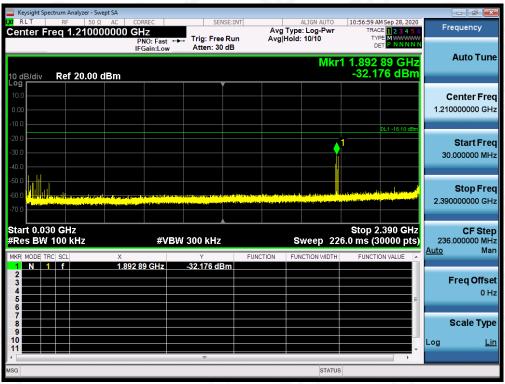
LIMITS AND MEASUREMENT RESULT				
A modica de la 1 invita	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS		
intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS		

Note: The limits reference level is according to the test plot of -6dB bandwidth.

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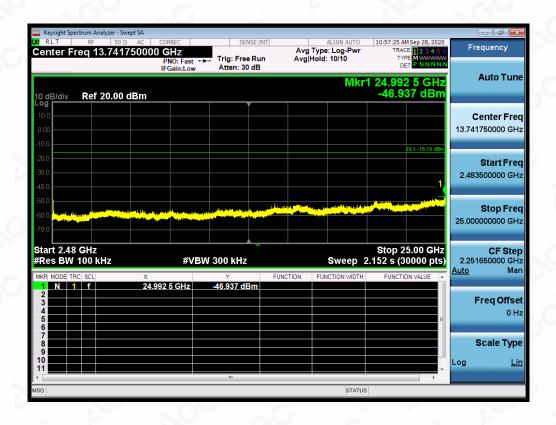
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11b FOR MODULATION IN LOW CHANNEL





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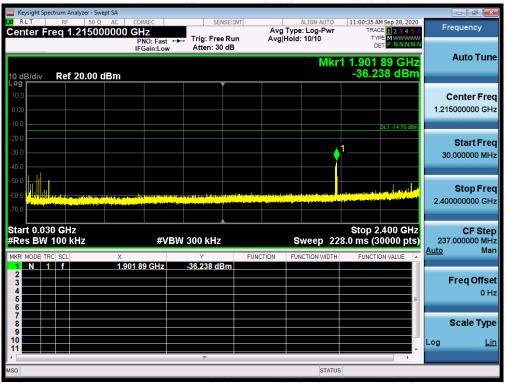




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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN MIDDLE CHANNEL

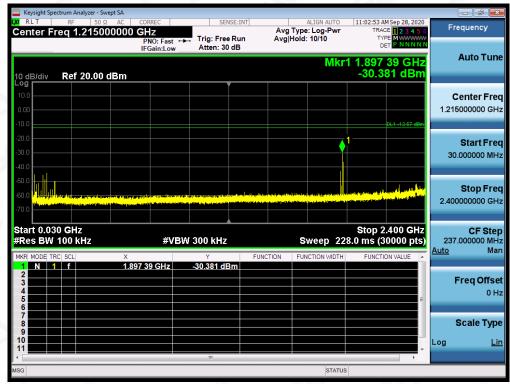


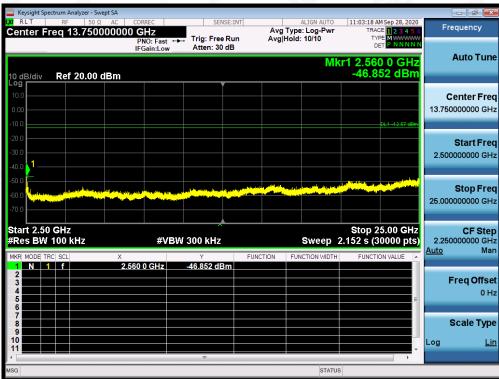


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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN HIGH CHANNEL

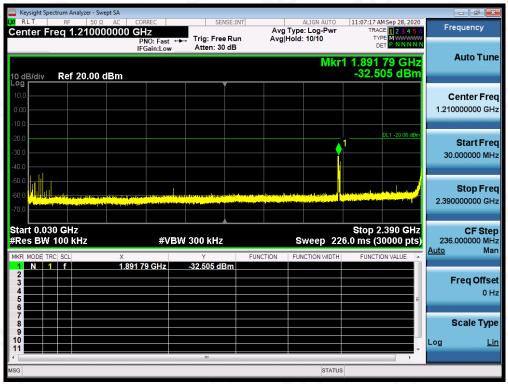




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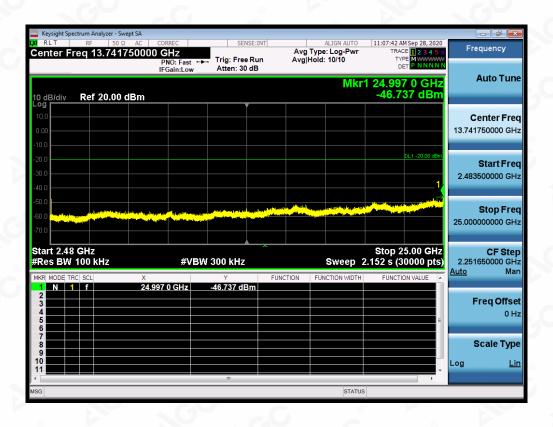
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11g FOR MODULATION IN LOW CHANNEL





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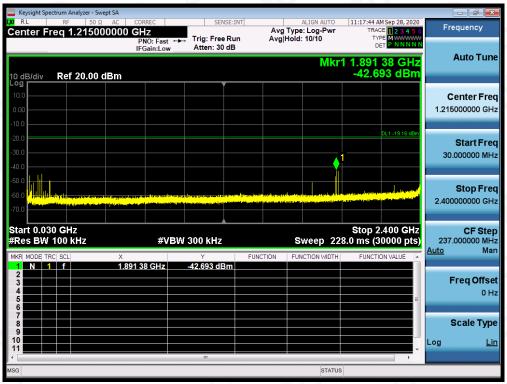




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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN MIDDLE CHANNEL

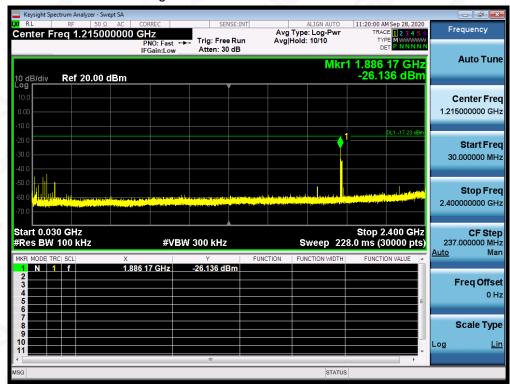


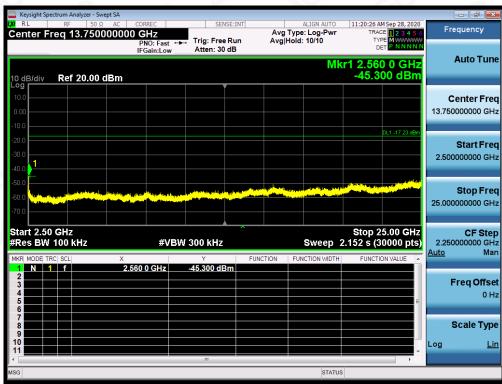


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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN HIGH CHANNEL

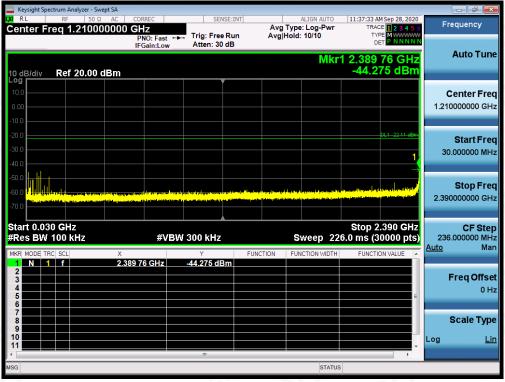




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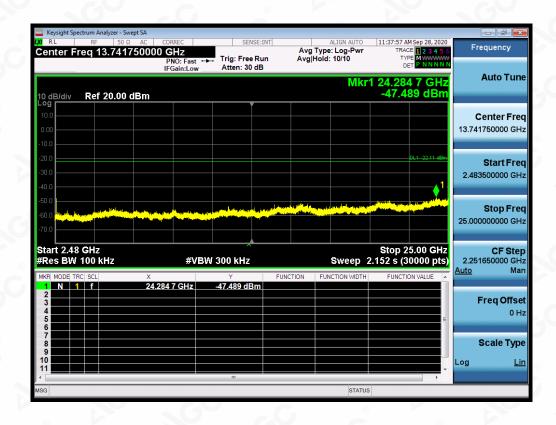
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n20 FOR MODULATION IN LOW CHANNEL





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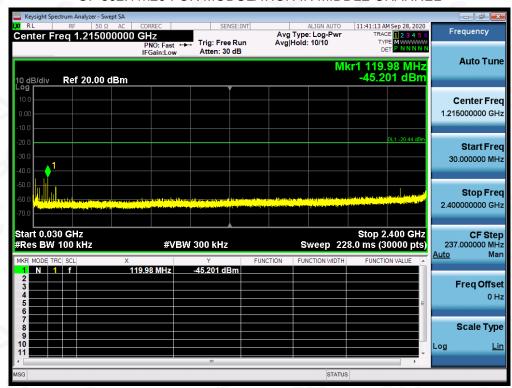


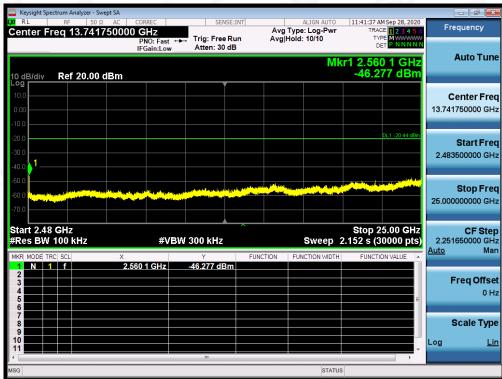


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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL

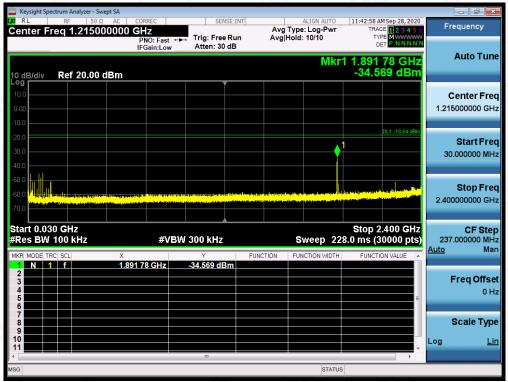


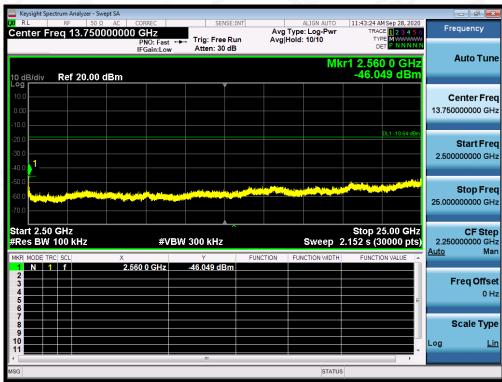


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TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN HIGH CHANNEL





Note: Emissions from 2483.5-2500MHz which fall in the restricted bands had been considered with the radiated

emission limits specified.

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Attestation of Global Compliance(Shenzhen)Co., Ltd

Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

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10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the ANSI C63.10 (2013) item 11.10 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

10.4 LIMITS AND MEASUREMENT RESULT

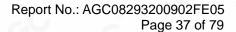
TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11b with data rate 1

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-1.354	8	Pass
Middle Channel	0.611	8	Pass
High Channel	1.859	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY			S
TEST MODE	802.11g with data rate 6	C ₁ C	8	(3)

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-6.256	8	Pass
Middle Channel	-5.339	8	Pass
High Channel	-3.215	8	Pass

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TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11n 20 with data rate 6.5

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-7.721	8	Pass
Middle Channel	-6.079	8	Pass
High Channel	-3.815	8	Pass

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802.11b TEST RESULT TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



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